National Park Service
U.S. Department of the Interior

Northeast Region
Philadelphia, Pennsylvania

Natural and Social Science Study Proposal and Deliverable Guidelines

Natural Resources Report NPS/NER/NRR--2004/001

ON THE COVER
States within the Northeast Region of the National Park Service. Arrowheads indicate locations of national park units. Map courtesy of James Farrell, National Park Service.

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Northeast Region, National Park Service

November 2004 (revised November 2005)

U.S. Department of the Interior
National Park Service
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Philadelphia, Pennsylvania

The Northeast Region of the National Park Service (NPS) comprises national parks and related areas in 13 New England and Mid-Atlantic states. The diversity of parks and their resources are reflected in their designations as national parks, seashores, historic sites, recreation areas, military parks, memorials, and rivers and trails. Biological, physical, and social science research results, natural resource inventory and monitoring data, scientific literature reviews, bibliographies, and proceedings of technical workshops and conferences related to these park units are disseminated through the NPS/NER Technical Report and Natural Resources Report series. The reports are a continuation of series with previous acronyms of NPS/PHSO, NPS/MAR, NPS/BSO-RNR, and NPS/NERBOST. Individual parks may also disseminate information through their own report series.

Natural Resources Reports are the designated medium for information on technologies and resource management methods; "how to" resource management papers; proceedings of resource management workshops or conferences; and natural resource program descriptions and resource action plans.

Technical Reports are the designated medium for initially disseminating data and results of biological, physical, and social science research that addresses natural resource management issues; natural resource inventories and monitoring activities; scientific literature reviews; bibliographies; and peer-reviewed proceedings of technical workshops, conferences, or symposia.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the National Park Service.

Print copies of reports in these series, produced in limited quantity and only available as long as the supply lasts, or, preferably, file copies on CD, may be obtained by sending a request to the address on the back cover. Print copies also may be requested from the NPS Technical Information Center (TIC), Denver Service Center, PO Box 25287, Denver, CO 80225-0287. A copy charge may be involved. To order from TIC, refer to document D-13.

This report may also be available as a downloadable portable document format file from the Internet at http://www.nps.gov/nero/science/.

Please cite this publication as:

Northeast Region, National Park Service. November 2004 (revised November 2005). Natural and Social Science Study Proposal and Deliverable Guidelines. Natural Resources Report NPS/NER/NRR--2004/001. National Park Service. Philadelphia, PA.

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The Northeast Region, National Park Service thanks Scott Tiffney, The Pennsylvania State University, Bill Slocumb, North Carolina State University, and Jeff Selleck, National Park Service, for their content recommendations.

We especially wish to acknowledge the significant contributions of Emily Hill, The Pennsylvania State University, to the development of the contents of this document. Also, this report is a product of her skills in word processing and formatting.

Introduction

In order to improve the protection and management of national park resources, the Northeast Region's Division of Natural Resource Stewardship and Science supports programs of research, inventory, and monitoring on the natural and social values of park areas. The Division's staff provides the necessary programmatic and field support to park areas. Park priorities are carefully evaluated and developed into regional priorities to distribute available program funds and personnel time.

The National Park Service (NPS) competitively solicits for research, inventory, and monitoring proposals from independent scientists and professional research institutions based on high-priority park management needs. Proposals may be requested at any time; however, planning and funding is conducted on a fiscal year (October 1—September 30) basis. Multiyear studies may be necessary, although complete funding will depend on annual budgetary allocations. Contracts and cooperative or interagency agreements are usually used to execute an award and obligate Government funding.

The National Park Service is aware that descriptive information necessary for the appropriate management of natural resources may not always be of value to researchers pursuing specialized research or faced with publication requirements. Additional research measurements, questions, or components not dictated by park information needs are acceptable provided that they are appropriate and compatible with NPS policy. Any expenses associated with non-requested research activities should be identified in the study proposal and provided for through non-NPS funding.

The appropriate Northeast Regional Science Advisor and/or park resource manager(s) should be consulted prior to the preparation of any proposal regarding study goals and objectives, priority, availability of funds, and degree of detail necessary in the proposal. The latter will vary depending on the complexity and scope of the study. The study proposal, prepared according to the specific requirements outlined in this document, must be submitted to a designated NPS Key Official for distribution to appropriate NPS park and regional personnel for management review and environmental compliance. The proposal may also be sent to non-competing scientists outside the National Park Service for professional scientific review comments. The investigator(s) will be notified by the designated NPS Key Official concerning the results of the review process as well as decisions regarding funding.

Scientific Research and Collecting Permits

An NPS Scientific Research and Collecting Permit must accompany a proposal for scientific activities pertaining to natural resource or social science studies that involve fieldwork, specimen collection, and/or have the potential to disturb resources or visitors. In addition, some NPS areas require access permits for off-road travel, camping, and other activities. The park where the study is to be conducted can provide information regarding other required permits. Federally funded collection of information from the

public, such as formal surveys, may require approval from the Office of Management and Budget.

Other federal or state agency permits or approvals may also be required including U.S. Fish and Wildlife Service threatened and endangered species permits and migratory bird permits, and approvals by an Institutional Animal Care and Use Committee. Copies of such approved permits must accompany any application, when applicable. Separate agreements between the investigator and NPS are required when proposed studies or collected specimens are intended to support commercial research activities.

Application for a Scientific Research and Collecting Permit should be made at least 90 days in advance of field activities. Projects requiring access to restricted locations or proposing activities with sensitive resources require extensive review and can take 90 days or longer for a permitting decision. Application information is available at http://science.nature.nps.gov/research or by contacting the park where the study will be conducted, and can be submitted either through the Internet or mail to the park. It is the responsibility of the principal investigator to secure all permit approvals prior to the initiation of the project.

General NPS conditions (requirements and restrictions) will be attached to all Scientific Research and Collecting Permits issued. These conditions must be adhered to by permit recipients. Additional park-specific conditions may also be included that address unique park resources or activities. An NPS permit is valid only for the activities authorized in the permit. The principal investigator must notify the NPS in writing of any proposed changes. Requests for significant changes may necessitate re-evaluation of the permit conditions or development of a revised proposal.

When approved, the Scientific Research and Collecting Permit signifies approval of the research proposal by the park Superintendent and authorizes fieldwork to be conducted in that park, pursuant to the general conditions and specific stipulations (requirements and restrictions) of the permit. It does not infer, in any way, an obligation of NPS funds.

If specimens are to be collected, the permit application and proposal must clearly identify the intended use of the specimens and specifically describe which specimens, if any, are to be stored as permanent vouchers and where they will be stored. Specimens which will be collected from National Park System lands and which will be permanently retained as voucher specimens must bear official NPS museum labels and their catalog numbers must be registered in the NPS National Catalog. These collections, whether stored in an NPS facility or loaned to a qualified museum or university for long-term storage and use, must be catalogued and maintained as part of the park's museum collection in accordance with the NPS (a) Museum Handbook, (b) Automated National Catalog System User Manual, and (c) Special Directive 80-1, "Guidance for Meeting NPS Preservation and Protection Standards for Museum Collections" (Revised 3/9/90). If necessary, these requirements will be stipulated in the permit, which describes the terms and conditions under which specimens may be collected and stored. The National Park Service will supply the appropriate labels and instructions.

Studies Not Funded by National Park Service

These proposal requirements also apply to any study or scientific collections proposed to be conducted in a park by scientists who do not require NPS funding. A Scientific Research and Collecting Permit and all other relevant permits must be obtained, and a proposal must be submitted for review and approval. Conditions to be included in a permit may include report requirements and study restrictions as to locations, timing, and methods.

Study Proposal Format Guidelines

- Submit electronically as MSWord 97 (or more recent version) file as an email attachment, on a Windows formatted CD-ROM, and/or as hardcopy on 8 ½" ×11" white bond paper, as required by the NPS contact person.
- Maintain 1" margins top, bottom, left, and right throughout document with 0.5" header and footer margins (for page numbering).
- Use Times New Roman 12 pt font throughout.
- Format paragraphs flush left, no indent, no end-of-line hyphenation, line spacing single, and paragraphs separated from each other double-spaced.
- Commence pagination on the first page of text as a footer and centered.
- Use title case (i.e. first letter of all words capitalized except articles, prepositions, and conjunctions) for all section headings.
- Use the following styles for section headings:

First Order Header [center, triple space, begin text]

Second Order Header [flush left, double space, begin text]

<u>Third Order Header</u> [flush left, underlined, double space, begin text]

Fourth Order Header: [flush left, colon, two spaces, begin text (same line)]

Fifth Order Header: [flush left, italicize, colon, one space, unitalicize, begin text (same line)]

Study Proposal Content Guidelines

A study proposal is a justification and description of the work to be done, and includes cost and time requirements. Proposals must be specific enough to serve as "blueprints" for the investigative efforts. Step-by-step plans for the actual investigations must be spelled out in advance, with the level of detail being commensurate with the cost and scope of the project and the needs of management.

The following list provides a general outline of first order headings/sections for study proposals.

- Cover Page
- Table of Contents (for longer proposals)
- Abstract
- Statement of Issue
- Literature Summary
- Objectives/Hypotheses
- Study Area
- Methods and Procedures
- Quality Assurance/Quality Control
- Specimen Collections
- Deliverables
- Special Requirements and Concerns
- Literature Cited
- Peer Review
- Budget
- Personnel and Qualifications

Cover Page

The cover page must contain the following information:

- Title of Proposal
- Current Date
- Investigator's(s')—name, title, organizational affiliation, address, telephone and fax Numbers, and e-mail address of all investigators
- Proposed Starting Date
- Estimated Completion Date
- Total Funding Support Requested from the National Park Service
- Signatures of Principal Investigator(s) and other appropriate institutional officials

Abstract

The abstract should contain a short summary description of the proposed study, including reference to major points in the Statement of Issue, Objectives, and Methods and Procedures sections.

Statement of Issue

Provide a clear precise summary of the problem to be addressed and the need for its solution. This section should include statements of the importance, justification, relevance, timeliness, generality, and contribution of the study. Explain why the study needs to be done within a National Park System unit, and how the NPS will benefit. Describe how any products will be used, including any anticipated commercial use.

Literature Summary

This section should include a thorough but concise literature review of current and past research that pertains to the proposed research, especially any pertinent research conducted at the specified NPS unit(s). A discussion of relevant legislation, policies, and park planning and management history, goals, and objectives should also be included. Each park maintains a computerized list of plant and animal species that have been documented from the park and a bibliographic database of park natural resources planning, management, and research documents. Your park contact can provide access to these sources.

Objectives/Hypotheses

A very specific indication of the proposed outcomes of the project should be stated as objectives or hypotheses to be tested. Provide a brief summary of what information will be provided at the end of the study and how it will be used in relation to the problem. These statements should flow logically from the statement of issue and directly address the management problem.

Establish data quality objectives in terms of precision, accuracy, representativeness, completeness, and comparability as a means of describing how good the data need to be to meet the project's objectives.

Study Area

Provide a detailed description of the geographic area(s) to be studied and include a clear map delineating the proposed study area(s) and showing specific locations where work will occur.

Methods and Procedures

This section should describe as precisely as possible how the objectives will be met or how the hypotheses will be tested. Include detailed descriptions and justifications of the field and laboratory methodology, protocols, and instrumentation. Describe the experimental design, population, sample size, and sampling approach. Summarize the statistical and other data analysis procedures to be used. Also include a detailed project time schedule that includes start, fieldwork, analysis, reporting, and completion dates. Quality Assurance/Quality Control

Adequate quality assurance/quality control (QA/QC) procedures help insure that data and results are: credible and not an artifact of sampling or recording errors; of known quality; able to stand up to external scientific scrutiny; and accompanied by detailed method documentation. Describe the procedures to be used to insure that data meet defined standards of quality and program requirements, errors are controlled in the field, laboratory, and office, and data are properly handled, documented, and archived. Describe the various steps (e.g. personnel training, calibration of equipment, data verification and validation) that will be used to identify and eliminate errors introduced during data collection (including observer bias), handling, and computer entry. Identify the percentage of data that will be checked at each step.

Specimen Collections

Clearly describe the kind (species), numbers, sizes, and locations of animals, plants, rocks, minerals, or other natural objects to be sampled, captured, or collected. Identify the reasons for collecting, the intended use of all the specimens to be collected, and the proposed disposition of collected specimens. For those specimens to be permanently retained as voucher specimens identify the parties responsible for cataloging, preservation, and storage and the proposed repository. (Refer to the previous Scientific Research and Collecting Permit section for specific requirements regarding collections.)

Deliverables

The proposal must indicate the number and specific format of hard and/or electronic media copies to be submitted for each deliverable. The number and format will reflect the needs of the park and the designated NPS Key Official. Indicate how many months after the project is initiated (or the actual anticipated date) that each deliverable will be submitted.

Deliverables are to be submitted or presented to the designated NPS Key Official unless otherwise stated. Deliverables that are usually required are as follows:

Reports and Publications

The publication policy of the National Park Service is to disseminate natural resource scientific, technical, and management information for both the advancement of science and the achievement of the National Park Service's mission. NPS policy requires that the results of all scientific activities conducted in parks will be made available to park managers, the scientific community, and the public through both technical publications and popular media.

Describe what reports will be prepared and the timing of reports. Four types of reports are usually required in fulfillment of natural and social science study contracts or agreements:

(1) progress report(s) (usually quarterly, semiannually, or annually). See Appendix A for format and content guidelines.

(2) draft final and final report(s). See Appendix B for format and content guidelines.

(3) Park Science article. *Park Science* is a biannual NPS resource management bulletin that reports recent and ongoing natural and social science research, its implications for park planning and management, and its application to resource management. It is published in hard copy and is available on the Web at http://www2.nature.nps.gov/parksci/. The principal audience is park staff with a secondary focus on other federal and state agencies, private conservation organizations, the academic community, and interested public. Articles emphasize the utility of natural or social science research in park planning and management and describe a scientific process, technique, or development that is of substantial novelty, practicality, or refinement.

Acceptance for publication is based on peer review and editorial criteria that include article appeal, contribution to the field of resource management, completeness, clarity, scientific soundness, policy considerations, and merit. Each investigator is required to submit at least one article with the draft final report to the designated NPS Key Official for appropriate NPS regional and park review and comment. Final copy will be forwarded to the Park Science Editorial Board for consideration. Other articles may be submitted during the course of the study to report on significant progress or preliminary findings. Approved articles will be published in upcoming issues on a space-available basis.

Depending upon the scope of the study and the desire of the investigator, the article can range from a one to five paragraph "Highlight," a short article of not more than 350 words, or a feature article ranging from 750 to 1,500 words. Digital files of the articles and related illustrations should be e-mailed to the designated NPS Key Official as attachments or mailed on a CD-ROM. Photographs should reinforce the article's main points by showing personnel at work, project equipment in use, techniques, locator maps, species portraits, and data. Digital photographs at 300

pixels per inch resolution and saved in TIF format are ideal. Guidelines for contributors to Park Science are available at the Web site.

(4) Investigator's Annual Report(s).

Scientists issued a Scientific Research and Collecting Permit by the NPS to conduct scientific studies pertaining to natural resources or social sciences are required, as a condition of the permit, to provide an Investigator's Annual Report (IAR) at the end of each calendar year the study is active (including year of completion). The IAR enables investigators to document the objectives and annual findings of the study and bibliographic references either resulting from the study or significantly related to the study. Bibliographic references may include published reports, unpublished reports, journal articles, dissertations and theses, books, conference proceedings, maps, or other sources of information potentially of value to future scientific efforts. Each IAR should pertain to the research accomplishments of a single study, conducted within an individual park, during all or part of the report calendar year. Details provided in the report should serve as a stand-alone abstract. Objectives should be stated using no more than 4,000 characters, and accomplishments should be stated using no more than 4,000 characters. Instructions for completion and submission are available at http://science.nature.nps.gov/research/. The IAR can also be completed in hard copy form or MSWord document and sent to the appropriate NPS park contact person.

The NPS will contact permit holders near the beginning of each calendar year to request the prior year's report and explain how to access and use the system. Principal investigators are responsible for the content of their reports. NPS staff will not modify reports received unless agreed upon by the principal investigator responsible for the report. Park research coordinators may request copies of field notes, data, reports, publications and/or other materials resulting from studies conducted in NPS areas. Additional deliverables may be required of studies involving NPS funding or participation.

In addition, investigators are encouraged to publish the findings of their investigations in refereed professional, scientific publications and present findings at conferences and symposia. The NPS Key Official and appropriate park Superintendent(s) appreciate opportunities to review manuscripts and receive copies of final reprints/publications.

Data Files

Provide descriptions of any spatial (GIS) and non-spatial data files that will be generated and submitted as part of the research. Non-spatial data must be entered onto Windows CD ROMs in Access or Excel. Spatial data, which includes GPS generated files, must conform to the guidelines described in Appendix C.

Metadata

For all non-spatial and spatial data sets or information products, documentation of information (metadata) describing the extent of data coverage and scale, the history of where, when, and why the data were collected, who collected the data, and the methods used to collect and process the data must also be provided as final deliverables. See Appendix C for metadata requirements related to spatial data.

Oral Presentations

Three types of oral briefings should be included: pre-study, annual, and closeout. These briefings will be presented to park staff and other appropriate individuals. In addition, investigators should conduct periodic informal briefings with park management staff throughout the study whenever an opportunity arises. During each park visit, researchers should provide verbal updates on project progress. Frequent dialogue between researchers and park staff is an essential element of a successful research project.

Labeled Natural History Specimens and Associated Project Documentation

Natural resource specimens which will be collected from National Park System lands and permanently retained as vouchers at a nationally accredited site that uses modern curation techniques, including computerized database management of specimens it acquires, are to be properly labeled with official NPS museum labels and submitted along with associated documentation to the designated repository. A report on the collection activities and the data derived from collections must be submitted to the park Superintendent according to the conditions and requirements of the collecting permit. (Refer to the previous Scientific Research and Collecting Permit section for more detailed information.)

Other

Describe other materials that could be produced and submitted that would be beneficial to NPS management. Aerial photographs, digital photographs, maps, color slides, videotapes, interpretive brochures and exhibits, training sessions, survey forms, and field notes are examples of additional products that may be requested to assist in communicating or interpreting research results.

Special Requirements and Concerns

Provide information on the following topics where applicable. Attach copies of any supporting documentation that will facilitate processing of your application.

NPS Assistance

Describe any NPS assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from park staff. It is important that all equipment, facilities, services, and logistical assistance expected to be provided by the National Park Service be specifically identified in this section so all parties are in clear agreement before the study begins.

Ground Disturbance

Describe the type, location, area, depth, number, and distribution of expected ground-disturbing activities, such as soil pits, cores, or stakes. Describe plans for site restoration of significantly affected areas.

Proposals that entail ground disturbance may require an archeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including identification of each ground disturbance area on a USGS 7.5-minute topographic map.

Site Marking

Identify the type, amount, color, size, and placement of any flagging, tags, or other markers needed for site or individual resource (e.g. trees) identification and location. Identify the length of time it is needed and who will be responsible for removing it.

Access to Study Sites

Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe duration, location, and number of participants for planned backcountry camping.

Use of Mechanized and Other Equipment

Describe any field equipment, markers, or supply caches by type, number, and location. You should explain the need to use these materials and how long they are to be left in the field.

Safety

Describe any known potentially hazardous activities, such as electrofishing, rock climbing, scuba diving, whitewater boating, aircraft use, wilderness travel, wildlife capture or handling, wildlife immobilization, or use of explosives.

Chemical Use

Identify chemicals and hazardous materials that you propose using within the park. Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into the environment. Attach copies of Material Safety Data Sheets.

Animal Welfare

If the study involves vertebrate animals, describe your protocol for any capture, holding, marking, tagging, tissue sampling, or other handling of these animals (including the training and qualifications of personnel relevant to animal handling and care). If your institutional animal welfare committee has reviewed your proposal, please include a photocopy of their recommendations. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal.

Wilderness “Minimum Requirement” Protocols

If any of your activities will be conducted within a location administered by the NPS as a designated, proposed, or potential wilderness area, your proposal must describe how the project adheres to wilderness “minimum requirement” and “minimum tool” concepts. Refer to the park’s wilderness management plan for further information.

Literature Cited

List all reports and publications cited in the proposal.

Peer Review

Provide the names, titles, addresses, and telephone numbers of individuals with subject-area expertise who have reviewed the research proposal. If the reviewers are associated with the investigator's research institution or if the proposal was not reviewed, please provide the names, titles, addresses, and telephone numbers of 3-5 potential subject-area reviewers who are not associated with the investigator's institution. These individuals will be asked to provide reviews of the proposal, progress reports, and the draft final report.

Budget

The budget must reflect both funding and assistance that will be requested from the National Park Service and the cooperator's contributions on an identified periodic (usually annual) basis.

Personnel Costs

Identify salary charges for principal investigator(s), research assistant(s), technician(s), clerical support, and others. Indicate period of involvement (hours or months) and pay rate charged for services. Be sure to include adequate time for data analysis and report writing and editing.

Fringe Benefits

Itemize fringe benefit rates and costs.

Travel

Provide separate estimates for fieldwork and meetings. Indicate number of trips, destinations, estimated miles of travel, mileage rate, air fares, days on travel, and daily lodging and meals charges. Vehicle mileage rate cannot exceed $0.325/mile. Charges for lodging and meals are not to exceed the maximum daily rates set for the locality by the Federal Government (contact NPS Key Official for appropriate rates).

Equipment

Itemize all equipment to be purchased or rented and provide a brief justification for each item costing more than $1,000. Be sure to include any computer-related costs. For proposals funded under NPS agreement or contract, the National Park Service reserves the right to transfer the title of purchased equipment with unit cost of $1,000 or more to the Federal Government following completion of the study. These items should be included as deliverables.

Supplies and Materials

Purchases and rentals under $1,000 should be itemized as much as is reasonable.

Subcontract or Consultant Charges

All such work must be supported by a subcontractor's proposal also in accordance with these guidelines.

Specimen Collections

Identify funding requirements for the cataloging, preservation, and storage of any collected specimens that will be permanently retained.

Printing and Copying

Include costs for preparing and printing the required number of copies of progress reports, the draft final report, and the final report. In general, a minimum of five (5)

copies of progress reports (usually due quarterly, semiannually, or as specified in agreement) and the draft final report, and ten (10) copies of the final report are required.

Indirect Charges

Identify the indirect cost (overhead) rate and charges and the budget items to which the rate is applicable.

Cooperator's Contributions

Show any contributing share of direct or indirect costs, facilities, and equipment by the cooperating research institution.

Outside Funding

List any outside funding sources and amounts.

Personnel and Qualifications

List the personnel who will work on the project and indicate their qualifications, experience, and pertinent publications. Identify the responsibilities of each individual and the amount of time each will devote. A vita or resume for each principal investigator may be included here but is not required, unless so notified.

Appendix A.

Progress Report Format and Content Guidelines

Progress Report Format Guidelines

- Depending on the scope of the project, progress reports are usually required quarterly, semiannually, or annually.
- As specified in the research permit, contract, or agreement, submit progress reports to the designated NPS Key Official electronically as MSWord 97 (or more recent version) file as an e-mail attachment, on a Windows formatted CD-ROM; and/or as hardcopy double-sided on 8 1/2”×11” white bond paper.
- Maintain 1" margins top, bottom, left, and right throughout the document.
- Use Times New Roman 12 pt font throughout.
- Format paragraphs flush left, no indent, no end-of-line hyphenation, line spacing single, and paragraphs separated from each other double-spaced.
- Commence pagination on the first page of text as a footer and centered.
- Use title case (i.e. first letter of all words capitalized except articles, prepositions, and conjunctions) for all section headings.
- Use the following styles for section headings:

First Order Header [center, triple space, begin text]

Second Order Header [flush left, double space, begin text]

Third Order Header [flush left, underlined, double space, begin text]

Fourth Order Header: [flush left, colon, two spaces, begin text (same line)].

Fifth Order Header: [flush left, italicize, colon, one space, unitalicize, begin text (same line)]

Progress Report Content Guidelines

The progress report is a brief, informal, narrative statement of the status of all work accomplished during the period specified, and a summary of work to be performed during the following period. Progress reports should include:

a) a title page containing the following information: the words "Progress Report"; title of project; investigator name(s), affiliation, and address; NPS contract, agreement or purchase order number; date of submission; and time period covered by report.

b) brief summaries of the statement of issue, objectives, study area, and methods and procedures;

c) a quantitative description of overall progress and significant findings to date;

d) an indication of any current problems that may impede performance and proposed corrective actions; and

e) a brief discussion of the work to be performed during the next reporting period.

Appendix B.

Draft Final and Final Report Format and Content Guidelines.

Introduction

At the completion of a study, the investigator must submit a draft final report (double spaced) that documents the study methods, results, and conclusions of the entire project as required by the contract or agreement. The specified number of hard copies (usually five to ten) must be submitted to the designated National Park Service (NPS) Key Official on or before the date identified in the contract or agreement. The report should be written to an "audience" of park managers who may lack training or exposure to the particular discipline. The report may also be distributed to other government agencies, the scientific community, politicians, reporters, and the public. Keep the main body of the report short and concise. This may be accomplished through the use of appendixes for extensive literature reviews, detailed explanations of the research design and methods, supplementary data, information which does not directly address the research objectives specified by park managers, and highly technical material (equations, statistical analyses, and testing). Write in a non-technical, jargon-free style, avoiding or clearly explaining any scientific terms or terms unique to a specific discipline. Your goal is to clearly and concisely convey study results and management implications to a nonscientist. It is very important for purposes of proper review that both the draft and final reports adhere to the format and content guidelines presented in this manual.

If you prefer to produce a document in a format other than MSWord 97 (or a more recent version) using a specific publication/design software (e.g., InDesign CS), contact the NPS key official of your study to request a waiver of use of these guidelines.

Upon submission of the draft final report, the designated NPS Key Official will review the manuscript and seek additional management and scientific review comments from appropriate NPS regional and park personnel and peer members of the scientific community to ensure technical quality and accuracy of information. Review comments and recommended changes will then be returned to the author(s) for consideration and preparation of the final report.

All appropriate comments from draft final report reviews should be addressed and incorporated during the preparation of the final report (single spaced). Before duplication, a copy of the final report must be sent to the designated NPS Key Official for final approval of review modifications and format. Upon approval, a letter-quality, reproducible-copy original of the final report and the specified number of copies (usually ten to fifteen) must be submitted to the designated NPS Key Official on or before the date identified in the research permit, contract, or agreement. A CD-ROM containing the report in MSWord 97 (or more recent version) and as a pdf file, must also be submitted for posting on the science Web site for the Northeast Region at http://www.nps.gov/nero/science/. Because large documents in this format take a long time to download, particularly on systems using dial-up modems, the ideal maximum size of a pdf file should be approximately 3 MB (megabytes). A report that has a large file size should be divided into smaller parts, each yielding a pdf file of approximately 3 MB. The divisions should be made at logical stopping points, such as at the end of

major sections of the document, if possible. Where such sections (or appendixes) are themselves very large and must be divided into yet smaller files, the pdf files can be named, for example, "methods_part_1.pdf" and "methods_part_2.pdf".

The final report may be printed and distributed as part of an NPS Technical Report (NRTR) or Natural Resources Report (NRR) series. Reports printed in these series are not considered formal publications, and the information may be subsequently submitted by authors to peer-reviewed journals. The designated NPS Key Official will notify the author of the decision to print the final report in one of the series and will provide the series name and number and NPS Technical Information Center (TIC) document number. A pre-formatted electronic version document of a report front cover, back cover, and title page will be provided for final production.

Draft Final and Final Report Format Guidelines

Typing

- Submit all reports double-sided on 8 1/2 ” x 11 ” white bond paper, and in MSWord 97 (or more recent version) files and as a pdf version on CD-ROM, as required by the contract or agreement.
- Double-space, text only, draft final reports and single-space final reports.
- Maintain 1" margins top, bottom, left, and right throughout document.
- Use Times New Roman (preferred) or Arial12 pt font throughout and avoid bolding text.
- Start all First Order Heading sections on a new, right-hand, odd-numbered page.
- Format paragraphs flush left with no left indentation on the first line.
- Paragraphs should be single-spaced, double space between paragraphs.
- Do not hyphenate whole words at the end of a line; instead use an unjustified right margin.
- Number all pages sequentially centered at the bottom of the page:
  - The initial sections (title page, Table of Contents, list of Figures, Tables, and/or Appendixes, Abstract, Summary, and Acknowledgments) should be numbered sequentially using lower case Roman numerals (i, ii, iii). Paginagion begins on the title page, but actual page numbering begins on the back of the title page with Roman numberal ii.
  - The main body of the report (beginning with the Introduction) must be numbered sequentially using Arabic numerals (1,2,3).
  - Blank, left-hand, pages are to be counted but are not to be numbered (blank pages are blank pages).
- The order of brackets and related symbols is: ([{}]).
- Hyphenation: generally, use a hyphen between two or more words combined to form a modifier preceding the word modified, *except* when the first word ends in *ly*.
- Use Title Case (i.e., first letter of all words capitalized except articles, prepositions and conjunctions) for all section headings.
- The NPS has a preferred spelling list (Appendix D).

- Use the following styles for section headings:

First Order Header [center, triple space, begin text]

Second Order Header [flush left, double space, begin text]

Third Order Header [flush left, underlined, double space, begin text]

Fourth Order Header: [flush left, colon, two spaces, begin text (same line)].

Fifth Order Header: [flush left, italicize, colon, one space, unitalicize, begin text (same line)]

Figures (Example 1) and Tables (Example 2)

- Figures should be self-explanatory (easy to understand or follow) when viewed in shades of gray (black and white); use color only when absolutely necessary to display detail.
- Figures and tables must have brief descriptive titles; title font size should be the same as the text in the body of the report.
- Figure numbers and titles should be below the figure and left aligned.
- Table numbers and titles should be above the table and left aligned.
- Explanatory information and keys to symbols should be placed in the figure legend or as a table footnote at the bottom of the table.
- The title, headings, legend, and footnotes must contain all the information the reader needs to understand a table or figure without referring to the text. All figures (including maps and photographs) and tables should be in digital format as part of the final document. If line drawings and artwork are necessary, they must be in high-contrast black and white and of a professional reproducible quality.
- Do not place figures and tables on a page with text. They must be on their own numbered page immediately following the page (double-sided) in which they are first referenced in the text.
- Use sentence case for all figure and table titles; begin entries with a capitalized label (Figure or Table) followed by a space, then a number, then a period, then two spaces, and then the title, followed by a period (e.g., Figure 1. Map of survey area. [or] Table 21. Estimated larvae in survey area.). If the title is more than one line, additional lines start flush left.
- Figures and tables, respectively, are numbered sequentially with Arabic numerals in the order of their presentation in the text, i.e., Figure 1., Figure 2., Table 1., Table 2., etc.
- Every table and figure must be cited in the text.
- For figures and tables which are more than one page, repeat the figure or table number and title followed by "(continued)." in parentheses, for each additional page.

Example 1.

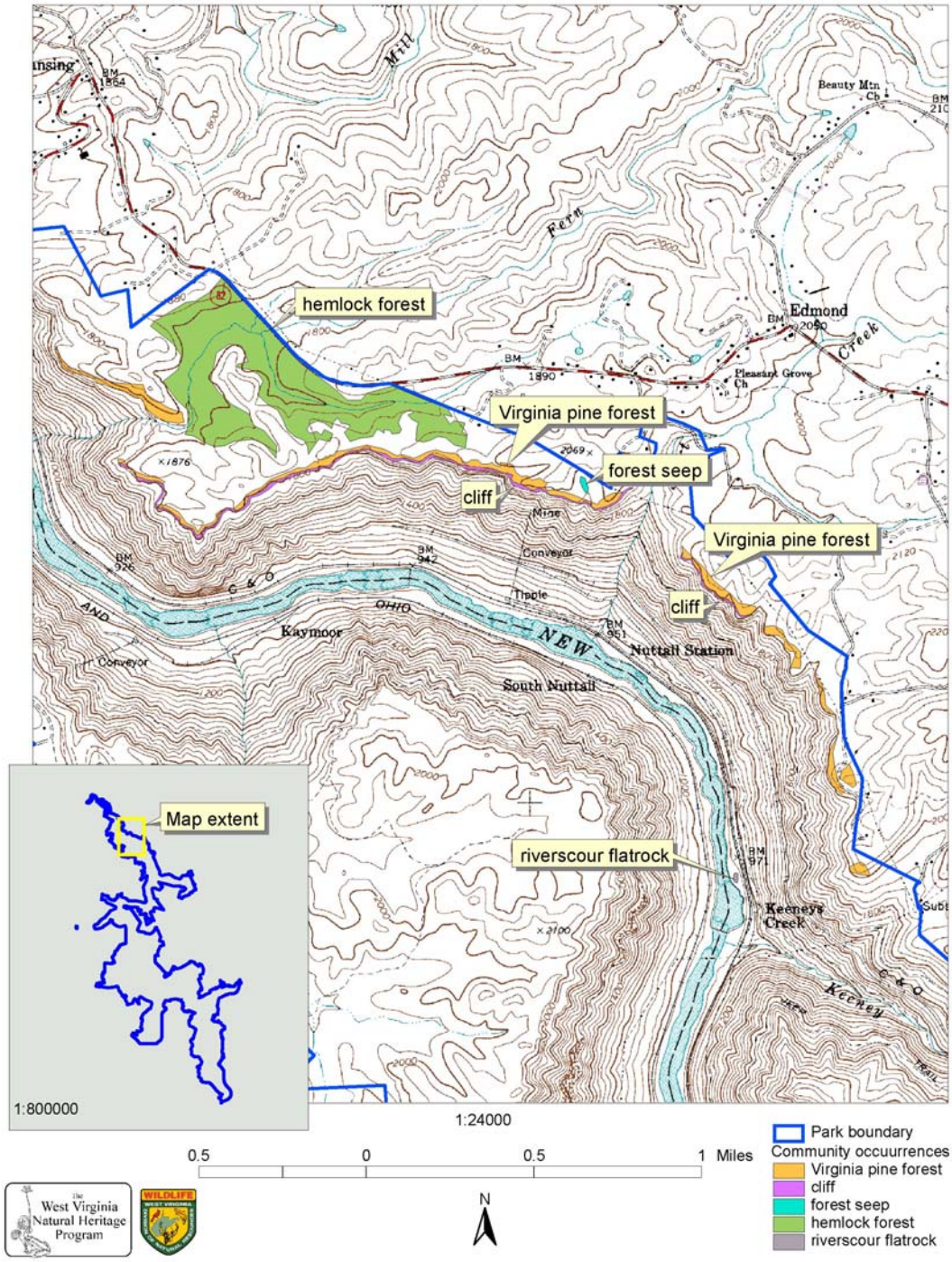

Figure 7. Map depicting the locations of cliffs, forest seep, hemlock forest, riverscour flatrock, and Virginia pine forests within the northern-most section of the park boundary.

Table 8. Vertebrates (excluding birds) and invertebrates that have special concern conservation status in West Virginia and are known to occur in NERI.

Scientific Name	Common Name	State Rank[1]	Global Rank[2]	Federal Rank
Amphibians				
Ambystoma jeffersonianum	Jefferson salamander	S[3]	G[4]	
Desmognathus quadramaculatus	Black-bellied salamander	S[3]	G[5]	
Eurycea lucifuga	Cave salamander	S[3]	G[5]	
Pseudotriton ruber	Northern red salamander	S[3]	G[5]	
Fish				
Nocomis platyrhynchus	Bigmouth chub	S[3]	G[4]	
Notropis scabriceps	New river shiner	S[2]	G[4]	
Phoxinus oreas	Mountain redbelly dace	S[3]	G[5]	
Mammals				
Myotis sodalis	Indiana bat	S[1]	G[2]	endangered
Virginia big eared bat	Cornynorhinus townsendii	S[2]	G[4]	endangered
Myotis leibii	small footed myotis	S[1]	G[3]	
Eastern big-eared bat	C. rafinesque bat	S[1]	G[3]	
Sorex dispar	Long-tailed shrew	S[2]	G[4]	
Ochrotomys nuttalli	Golden mouse	S[2]	G[5]	
Neotoma magister	Allegheny woodrat	S[3]	G[3]	
Reptiles				
Eumeces laticeps	Broad-headed skink	S[2]	G[5]	
Opheodrys aestivus	Rough greensnake	S[3]	G[5]	
Pseudemys concinna	River cooter	S[2]	G[5]	
Carphophis amoenus	Eastern worm snake	S[3]	G[5]	
Graptemys geographica	Common map turtle	S[2]	G[5]	
Insects				
Cicindela ancocisconensis	A tiger beetle	S[3]	G[3]	
Speyeria diana	Diana fritillary	S[2]	G[3]	

Table 8. Vertebrates (excluding birds) and invertebrates that have special concern conservation status in West Virginia and are known to occur in NERI (continued).

Scientific Name	Common Name	State Rank[1]	Global Rank[2]	Federal Rank
Mussels				
Lasmigona subviridis	Green floater	S^2	G^3	
Alasmidonta marginata	Elktoe mussel	S^2	G^4	
Cyclonaias turberculata	Purple wartyback	S^1	G^5	
Elliptio dilatata	Spike mussel	S^2	G^5	
Lampsilis ovata	Pocketbook mussel	S^1	G^5	
Quadrula quadrula	maple leaf	S^2	G^5	

[1]State rankings:
S^1 Five or fewer documented occurrences, or very few remaining individuals within the state. Extremely rare and critically imperiled.
S^2 Six to 20 documented occurrences, or few remaining individuals within the state. Very rare and imperiled.
S^3 Twenty-one to 100 documented occurrences. May be somewhat vulnerable to extirpation.
S^A Rare in the state but an accidental occurrence.

[2]The Nature Conservancy Global Rankings (TNC STATUS):
These are global rankings assigned by the Nature Conservancy (now Nature Serve).
G^1 Five or fewer documented occurrences, or very few remaining individuals globally. Extremely rare and critically imperiled.
G^2 Six to 20 documented occurrences, or few remaining individuals globally. Very rare and imperiled.
G^3 Twenty-one to 100 documented occurrences. Either very rare and local throughout its range or found locally in a restricted range; vulnerable to extinction.
G^4 Common and apparently secure globally; though it may be rare in parts of its range, especially at the periphery.
G^5 Very common and demonstrably secure, though it may be rare in parts of its range, especially at the periphery.

Example:

Table 1. Results of analysis of variance of the average number of species of seedling-sized shrub, tree and total stems for selected factors at pre-treatment, and one-, two- and four-years-after treatment in 1993. Differences were considered to be significant (Yes) if the F value had a probability of ≤ 0.05 (continued).

Tables:

- There should be one blank line space between the table title and the body of the table / first heading row.
- Font size within the actual table is generally at least one font size smaller than the text in the body of the report; exact size depending on amount of information in table.
- Numerical data in columns should be aligned with decimal tabs at equivalent places.

Column headings:

- Horizontal lines are placed above and below the column headers and below the last table row only.
- Do not use vertical lines within the body of the table.
- Column headings should be left-aligned over text columns, centered over numerical data.
- Include column headings on second and succeeding pages if a table runs onto more than one page.

Stub (or row) headings:

- Left-align, using sentence-style capitalization.
- Subcategories should be indented slightly.
- When the word "total" appears at the foot of a stub it is often indented more deeply than the greatest indentation or otherwise distinguished typographically.

Citing Literature Within the Body of the Report

- Follow the author and year system for citing literature references in the text. If you wish to mention the author in your discussion say, for example, "Wakeley (1954) reported that ..." Otherwise, place the author and year [e.g., (Wakeley 1954)] within or at the end of your statement.
- Separate citations of works by different authors in one set of parentheses with semicolons [e.g., (Wakeley 1954; McManus 1957)]; multiple works within one set of parenthesis are to be listed chronological, not alphabetical.
- Separate several cited works by the same author with commas (Hackett 1970, 1972a, 1972b) and list them chronological.
- When a cited work has two authors, list both [e.g., (Yahner and Mahan 2003)].
- When a cited work has three or more authors, list the first author et al. and year [e.g., (Yahner et al. 2002)].

In-text literature citations of personal communications should include the following, in order: agency or organization (if any), name of individual and job title, type of communication (phone conversation, interview, or use "pers. comm." if you don't know), and date. Personal communications should not be listed in the Literature Cited section of the report.

Measurement Units

- All measurement units must be metric.
- Include U.S. equivalent measurements parenthetically.
- Use abbreviated standard units of measure (Appendix E.) when with a numeral, whereas, units of measure are to be spelled out if no quantity is given (e.g., " 10 m " or "Tree height was measured in meters.").
- Retain only the final unit of measure in a series (e.g., 10 to 15 kg).
- Use "/" for ratios with numbers (8 deer/ha); use "per " without numbers (At Valley Forge National Park the number of deer per hectare was greater than ... ...).

Numbers

- Numbers from one through nine are written out; numbers above nine are expressed as numerals except when first word of sentence. Ordinal numbers (e.g., second, 23rd) are treated the same.
- Physical measurements (length, width, distance, area, volume, decimals, percentages, degrees, symbols, latitude/longitude, fractions over one) and time (days, years) are always expressed as numerals.
- When two numerals appear together (usually in compound modifiers), spell out one or recast the sentence (e.g., We needed 30 eight-cent stamps, *not* 30 8-cent stamps).
- When using symbols (i.e., <, =, >, %, $\leq$, $\geq$) do not include space between symbol and number (e.g., <22, $\leq$50, 98%).

Taxon Names

- The NPS has adopted ITIS (Integrated Taxonomic Information System) as its standard for taxonomy and nomenclature, and all scientific names should follow this standard. See http://www.itis.usda.gov/index.html.
- Use common species names of plants and animals, initially followed with scientific names parenthetically (beginning in the Introduction); thereafter, only the common name is necessary.
- If a large number of species are referred to in the text, a reference list of common and scientific names must be included as an appendix.
- Common animal and plant names should be in lowercase except when a proper name is part of the common name (e.g., alpine forget-me-not, American dipper, golden-mantled squirrel, ponderosa pine, Douglas fir).
- Abbreviations for species: sp. is singular; spp. is plural.

Copyrighting

- Authors are responsible for obtaining written permission for use of any copyrighted figures, tables, graphs, and information.

Errors

- Authors are responsible for conducting an editorial review of the draft report to ensure: clarity; proper grammar, spelling, and punctuation; accuracy and completeness of all numbers, tables, figures, and references; and adherence to these format and content guidelines.

Draft Final and Final Report Content Guidelines

The following list provides a general outline of first order headings for all draft and final reports. Each first order heading must begin on a new right hand page. These headings may vary or others may be added, but their order should approximate the following:

- Outside Front Cover [see Example 3a]
- Inside Front Cover [see Example 3b]
- Title Page (Front) [see Example 4a]
- Title Page (Back) [see Example 4b]
- Table of Contents [see Example 5]
- Figures [if applicable; see Example 6]
- Tables [if applicable; see Example 7]
- Appendixes [if applicable; see Example 8]
- Abstract
- Executive Summary
- Acknowledgments [optional]
- Introduction
- Study Area
- Methods
- Results
- Discussion
- Conclusions
- Literature Cited [see Example 9]
- Appendixes [if applicable]
- Inside Back Cover [see Example 10a]
- Outside Back Cover [see Example 10b]

Front Cover

The investigator will be provided with an electronic template containing the front cover, title page, and back cover. The report title, report series and number (provided by the

NPS key official upon approval of final report), and a digital photograph representing some facet of the study must be inserted on the outside front cover. A photograph description and credit must be entered on the bottom of the inside front cover. These items must be located in the positions as shown in Examples 3a and 3b.

Title Page

The report title, report series and number, authors and affiliations, and final report date (month and year that the approved final report is submitted to the NPS) must be inserted in the proper locations on the front of the title page in the template provided by the NPS (Example 4a). On the back of the title page, the contract or agreement numbers must be inserted in the fifth paragraph, the NPS Technical Information Center (TIC) document number (provided by the NPS key official upon approval of final report) must be inserted in the sixth paragraph, the report's citation must be inserted at the end of the material, and the NPS TIC document number and final report date must be inserted (left aligned) in the bottom line of the page. Again, all entries must be located in the positions as shown in Example 4b. Paginagion begins on the title page, but actual page numbering begins on the back of the title page with Roman numberal ii.

Table of Contents

Include a table of contents listing all following first and second order section headings contained in the report (Example 5).

- The Table of Contents will begin on a right-hand, odd-numbered page, beginning with Roman numeral iii.
- Use Title Case on all Table of Contents entries.
- Double-space entries.
- Indent Second Order Headings from First Order Headings 0.33 inches
- A space followed by a line of dots followed by a space should proceed from the last word of each entry to a right aligned page number.
- Allow page numbers to “stand alone ” on the right side of the page by spreading longer entries to additional lines, making sure that each additional line of the entry is indented to the same starting point as the first word of the entry.
- Repeat the heading [i.e., Table of Contents] followed by “continued ” in parentheses at the top and centered for each additional page of the Table of Contents.

Lists of Figures, Tables, and Appendixes

Include lists of figures, tables, and/or appendixes, as needed. Each of these lists must begin on a new, right-hand, odd-numbered (Roman numerals) page as a first order section (Examples 6, 7, and 8).

- Double-space entries.
- Use sentence case (i.e., capitalize only the first letter of the first word and any proper nouns) for titles of Figures, Tables, and Appendixes.

Example 3a. Outside Front Cover

National Park Service
U.S. Department of the Interior

Northeast Region
NPS key official inserts appropriate city and state here
(e.g., either Philadelphia, Pennsylvania or Boston, Massachusetts)

Title of Report Should be Placed Here in 14 Point Times New Roman Bold Font

Technical Report NPS/NER/NRTR--XXXX/~~XXX~~
Or
Natural Resources Report NPS/NER/NRR--XXXX/~~XXX~~

NPS key official chooses a series based on report content

Image area

Example 3b. Inside Front Cover

ON THE COVER
(replace this text: Description of image/photo used on front cover [Times New Roman 9-point font])
Photograph by: (replace this text: name of person or courtesy of name of park [Times New Roman 9-point font])

Example 4a. Title Page (Front)

Title of Report Should be Placed Here in 14 Point Times New Roman Bold Font

Technical Report NPS/NER/NRTR--XXXX/XXX
or
Natural Resources Report NPS/NER/NRR--XXXX/XXX

Name of Author or Names of Co-authors Here (Times New Roman 10-point font)

Address(es) of Author (Co-authors) at time work was performed (Times New Roman 8-point font)
Second Line of Address
City, State, and Zip Code

current address(es): (if applicable, use superscript after author's name above and here)
Second Line of Address
City, State and Zip Code

Month Year (Times New Roman 9-point font)

U.S. Department of the Interior
National Park Service
Northeast Region
NPS key official inserts appropriate city and state here (i.e., Philadelphia, Pennsylvania or Boston, Massachusetts**)**

Example 4b. Title Page (Back)

The Northeast Region of the National Park Service (NPS) comprises national parks and related areas in 13 New England and Mid-Atlantic states. The diversity of parks and their resources are reflected in their designations as national parks, seashores, historic sites, recreation areas, military parks, memorials, and rivers and trails. Biological, physical, and social science research results, natural resource inventory and monitoring data, scientific literature reviews, bibliographies, and proceedings of technical workshops and conferences related to these park units are disseminated through the NPS/NER Technical Report (NRTR) and Natural Resources Report (NRR) series. The reports are a continuation of series with previous acronyms of NPS/PHSO, NPS/MAR, NPS/BSO-RNR, and NPS/NERBOST. Individual parks may also disseminate information through their own report series.

Technical Reports are the designated medium for initially disseminating data and results of biological, physical, and social science research that addresses natural resource management issues; natural resource inventories and monitoring activities; scientific literature reviews; bibliographies; and peer-reviewed proceedings of technical workshops, conferences, or symposia.

Natural Resources Reports are the designated medium for information on technologies and resource management methods; "how to" resource management papers; proceeding of resource management workshops or conferences; and natural resource program descriptions and resource action plans.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the National Park Service.

This report was accomplished under Cooperative Agreement XXXX-X-XXXX, Task/Supplemental Agreement Number XXX with assistance from the NPS. The statements, findings, conclusions, recommendations, and data in this report are solely those of the author(s), and do not necessarily reflect the views of the U.S. Department of the Interior, National Park Service.

Print copies of reports in these series, produced in limited quantity and only available as long as the supply lasts, or, preferably, file copies on CD may be obtained by sending a request to the address on the back cover. Print copies also may be requested from the NPS Technical Information Center (TIC), Denver Service Center, PO Box 25287, Denver, CO 80225-0287. A copy charge may be involved. To order from TIC, refer to document D-XX.

This report may also be available as a downloadable portable document format file from the Internet at http://www.nps.gov/nero/science/.

Please cite this publication as:

LastName of Author, FI. MI., FI. MI. LastName of Co-Author, (etcetera if more than one co-author). Month Year. Title of Report. Technical Report NPS/NER/NRTR--XXXX/XXX or Natural Resources Report NPS/NER/NRR--XXXX/XXX. National Park Service. Philadelphia, PA or Boston, MA. (Times New Roman 10-point font)

NPS D-XX Month Year

Example 5. Table of Contents

Table of Contents

Example 5. Table of Contents (continued)

Table of Contents (continued)

Example 6

Figures

Page

Example 7

Tables

Page

Example 8

Appendixes

Page

- Begin entries with a capitalized label (Figure, Table, or Appendix) followed by a space, then a number (for figures and tables) or capitalized letter (for appendixes), then a period, then two spaces, then a title (e.g., “Figure 1. Map of survey area ”,“Table 21. Estimated larvae in survey area ”, or “Appendix G. Checklist of butterfly species ”).
- A space followed by a line of dots followed by a space should proceed from the last word of each title to a right aligned page number.
- Allow page numbers to “stand alone ” on the right side of the page by spreading longer titles to additional lines, making sure that each additional line of the title is left aligned and maintains a right indent of one inch.
- If there is only one Appendix, do not include a List of Appendixes page; list it as the last entry in the Table of Contents as Appendix with no letter afterward, only the title.
- Repeat the heading (e.g., List of Figures) followed by (continued) in parentheses at the top and centered for each additional page of the list.

Abstract

The abstract should briefly but concisely identify the authors' objectives, methods, principle results, and major conclusions. Use scientific names of major organisms. The recommended length is the shorter of 250 words or 3% of the length of the report.

Executive Summary

This “stand alone” section should summarize the prominent facts discussed in the report and the conclusions reached in relation to research objectives. It should be as brief as possible, yet cover the subject in a clearly written, non-technical style so that, on its own, this section tells the reader what the project was about and what conclusions were made. This section is often removed from the report and used by the park Superintendent to inform legislators, public individuals and organizations, and NPS park, regional, and Washington Office staff of the completion and results of the study.

Acknowledgments (optional)

Briefly acknowledge those who directly helped with research or writing. Acknowledgments of typists, illustrators, editors, and referees may be included, but generally are discouraged. Use only forename initials with surname(s)and do not include professional titles or academic degrees.

Introduction

The introduction should include the hypotheses and purpose of the investigation, research objectives, conditions under which the study was conducted, the general plan of treatment of the subject, and summary of previous work accomplished (literature review) that relates to the project.

Study Area

Provide a concise narrative description and justification of the study area(s)for the research. Include a detailed map of the study area(s)for further clarity.

Methods

Present a detailed explanation of the methods, materials, and analytical techniques that were used in the field, laboratory, and office during the study. Describe how, when, where, and by whom the data were acquired for the investigation. The methods should be documented so that the investigation could be exactly repeated, if necessary. Be sure to include how data were analyzed and what statistical tests were employed. Describe the process used for determining whether the data met the data quality objectives and, if not, what corrective actions were taken. Detailed information about QA/QC procedures for data collection, verification, and validation should be placed in an appendix if it is too lengthy and detracts from the main body of the text.

Results

In a logical sequence, present, in detail, the findings of the study that either support or provide evidence against the hypotheses or that answer the question(s)presented in the "Introduction ".Basic descriptive statistics (sample size, percentages, mean, median, maximum, and minimum)are appropriate when clearly presented. Avoid technical discussions of complex statistical testing; instead refer readers who may be interested in this type of information to an appendix.

Discussion

This section and the "Conclusions" section are the most important parts of the report. Present a clear interpretation of the data that addresses the hypotheses, objectives, or purpose for which the study was conducted. Be sure to include how this research is applicable to the park where it took place, and to other studies that have been conducted in that area of research. Other findings may be reported that would be of general interest to the scientific community.

Conclusions

Provide a specific and detailed summation of the conclusions of the research. In some instances, this is one of the few parts of the report that park managers will read. If the research was initiated due to specific park management needs, management implications should be emphasized and thoroughly discussed.

Recommendations regarding policy positions of the agency should not be included. If desired, recommendations of this nature should be covered in a special supplementary report separate from the scientific report.

Literature Cited

List all references cited in the report using the Council of Biology Editors (CBE) bibliographic style (Example 9).

- When part of the citation information is missing, skip to the next element (using the correct formatting punctuation), but make sure there is enough information for the reader to locate the reference. For example, skip report number if it is not available.
- Titles are written sentence style: only capitalize the first word in the title, first word in the subtitle, and proper names.
- Scientific names (i.e., species-specific names) in the title should be written in *italics.*
- When there is more than one author, include the word "and" before the last author's name.
- When the list of authors exceeds ten, only list the first ten and state and others for the balance.
- Use abbreviations for states (Appendix F) in the Literature Cited section.

Appendixes

Include supplementary materials (e.g., QA/QC procedures) that support the main body of the report.

- Each appendix must begin on a new, right-hand, odd-numbered page.
- A single appendix is labeled “Appendix”.
- If possible, the title should appear on the same page(s) with the appendix material.
- Appendixes are labeled sequentially with capitalized letters and a following period (e.g., Appendix A., Appendix B., etcetera), two spaces, followed by a brief, concise title in sentence case at the top of the page, ending with a period, left-aligned.
- There should be one blank line space between the appendix title and the body of the appendix.
- For appendixes that are more than one page, repeat the title at the top, followed by "(continued)." in parentheses, for each additional page.
- Alternatively, the appendix title can be placed centered on the top of the right-hand page preceeding the appendix material.

  Example:

  Appendix A. Common and scientific names of herbaceous (forbs and grasses), shrub, tree and vine species identified during the study and presented in this report (continued).

Back Cover

The electronic template provided to the investigator also includes the back cover (Examples 10a and 10b). The only entry that needs to be made is the NPS TIC document number and final report date (month and year) in the last line (left aligned) of the inside back cover page.

Example 9. Citing literature within the Literature Cited section of the report

- Agency as Author information: *Agency Name(s). Publication date. Title of document. Edition number. Publisher. City of Publication, State/Country of Publication.*

  Agency as Author example:

U.S. Department of Transportation, Federal Highway Administration, and West Virginia Department of Transportation (U.S. DOT and WV DOT). 1998. Draft Environmental Impact Statement, New River Parkway, I-64 to Hinton. WV DOT, Roadway Design Division. Charleston, WV.

- Book Information: *First author/editor Surname, Forename initial, Middle initial(s)., and Second author/editor Forename initial, Middle initial(s)., Surname, editors [if applicable]. Publication date. Title of book. Edition number. Publisher. City of Publication, State/Country of Publication.*

  Book Information example:

Knight, S. V., and V. N. Darkbloom, editors. 1998. Butterfly identification in our National Parks. Second edition. Blackwell Scientific Publications. Ithaca, NY.

- Chapter in Book or Paper in Conference Proceedings Information: *First author Surname, Forename initial, Middle initial(s) and Second author Forename initial, Middle initial(s), and Surname. Publication date. Title of chapter or paper. Pages page number-page number in First editor Forename initial, Middle initial(s), Surname and Second editor Forename, initial Middle initial(s), Surname, editors. Title of book or conference proceedings. Publisher. City of Publication, State/Country of Publication.*

  Chapter in Book example:

Pnin, P. V., and H. N. Humbert. 1999. Yesterday 's caterpillar: A re-examination of Lepidoptera morphology at Hopewell Furnace National Historic Site. Pages 131-313 in S. V. Odon and K. N. Krug, editors. Insect Studies in National Parks of the Eastern United States. University Park, PA.

  Paper in Conference Proceedings example:

Pnin, P. V., and H. N. Humbert. 1999. Yesterday 's caterpillar: A re-examination of Lepidoptera morphology at Hopewell Furnace National Historic Site. Pages 131-313 in .S. V. Odon and K. N. Krug, editors. Insect Studies 1998-1999. American Society of Entomologists. University Park, PA.

Example 9. Citing literature within the Literature Cited section of the report (continued)

- Journal Article Information: *First author Surname, Forename initial, Middle initial(s)., and Second author Forename initial, Middle initial(s), Surname. Publication date. Article title. Journal title Volume Number (Issue number).*

  Journal Article examples:

Balcom, B. J., and R. H. Yahner. 1996. Microhabitat and landscape characteristics associated with the threatened Allegheny woodrat. Conservation Biology 10.

Kinbote, C. V., and D. N. Haze. 1948. A new species of Cyclarus Nabokov. The Entomologist 81(1027).

- Report Information: *First author Surname, Forename initial, Middle initial(s), and Second author Forename initial, Middle initial(s), Surname. Publication date. Title of report. Report Identification Number. Publisher. City of Publication, State/Country of Publication.*

  Report examples:

Quilty, C. V., and A. N. Vokoban. 1961. A study of *lepidoptera* at Shenandoah National Park. Technical Report NPS/SHEN/NRTR-91/016. National Park Service. Luray, VA.

Yuill, A. A. 1988. An abandoned mine land survey of the New River Gorge National River. Final Report. National Park Service. Glen Jean, WV.

Yahner, R. H., B. D. Ross, and J. E. Kubel. April 2004. Comprehensive inventory of birds and mammals at Fort Necessity National Battlefield and Friendship Hill National Historic Site. Technical Report NPS/NERCHAL/NRTR-04/093. National Park Service. Philadelphia, PA.

- Web site example:

U.S. Environmental Protection Agency (US EPA). 2002. Overview of the human health and environmental effects of power generation: focus on sulfur dioxide, nitrogen oxides and mercury. Washington, DC. www.epa.gov/clearskies.

- Software example:

Ritland, K. 1996. Multilocus mating system program (MLTR) Version 1.1. Department of Botany. University of Toronto, Toronto.

Example 9. Citing literature within the Literature Cited section of the report (continued)

- Thesis Information: *Author Surname, Forename initial, Middle initial(s). Date of thesis. Title of thesis. Type of thesis. University.*

Thesis examples:

Zembla, V. N. 1997. A comparative ecological study of Madeleinea mashenka and Madeleinea lolita in Northeastern National Parks. M.S. thesis. Cornell University.

Karish, J. F. 1973. Parameter correlation effects in non-linear mathematical models for biological growth. M.S. thesis. The Pennsylvania State University, University Park.

Example 10a: Inside Back Cover

As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-XX Month Year

Example 10b: Outside Back Cover

National Park Service
U.S. Department of the Interior

Northeast Region
Natural Resource Stewardship and Science
NPS key official inserts appropriate street, city, and state address here
(i.e., either:
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2878

or:
15 State Street
Boston, Massachusetts 02109)

www.nps.gov/nero/science/

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Appendix C. Spatial Data Guidelines

Spatial data, which includes GPS generated files, must conform to these following guidelines:

Projections and Coordinate Systems

All digital geospatial data should be referenced to the standard presently in use at the park. The cooperator/contractor is to contact the park's GIS Coordinator for specific instructions. If a park does not currently have an active GIS program, the coordinate system should be the correct UTM zone in which the park is found; the datum should be the North American Datum of 1983 (NAD83); the ellipsoid should be the Geodetic Reference System (GRS80); and the units of measure should be meters.

Scale and Spatial Resolution (Vector Data)

New data should not exceed 1:24,000. The cooperator/contractor should contact the park's GIS coordinator for specific scale and spatial resolution requirements based on the scope of the project.

Scale and Spatial Resolution (Image Data-digital or aerial photography)

The cooperator/contractor should contact the park's GIS coordinator for specific scale and spatial resolution requirements based on the scope of the project. For vegetation classification under the NPS/USGS vegetation classification project, the current standard is 1:12,000 color infrared aerial photographs with 60% overlap and 30% sidelap.

Horizontal and Vertical Accuracy

All data should meet or exceed the following National Map Accuracy standards (Source: USGS Fact Sheet 078-96, September 1997).

> For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch. These limits of accuracy shall apply to positions of well-defined points only. Well-defined points are those that are easily visible or recoverable on the ground, such as the following: monuments or markers, such as benchmarks, property boundary monuments; intersections of roads and railroads; corners of large buildings or structures (or center points of small buildings). In general, what is well-defined will also be determined by what is plottable on the scale of the map within 1/100 inch. Thus, while the intersection of two roads or property lines meeting at right angles would come within a sensible interpretation, identification of the intersection of such lines meeting at an acute angle would not be practicable within 1/100 inch. Similarly, features not identifiable upon the ground within close limits are not to be considered as test points within the limits quoted, even though their positions may be scaled closely upon the map. This class would cover timber lines and soil boundaries.

> Vertical accuracy, as applied to contour maps on all publication scales, shall be such that not more than 10 percent of the elevations tested shall be in error by more than one-half the contour interval. In checking elevations taken from the map, the apparent vertical error may be decreased by assuming a horizontal displacement within the permissible horizontal error for a map of that scale.

The following table provides the allowable horizontal accuracy for some common scales:

Scale	Allowable error (feet)
1:40,000	67
1:24,000	40
1:20,000	33
1:12,000	33
1:9,600	27
1:4,800	13
1:2,400	6
1:1,200	3

Attribute Accuracy

At a minimum, an 80% or greater attribute accuracy at a 90% confidence level is required. The cooperator/contractor should contact the park's GIS coordinator for specific attribute accuracy requirements.

Spatial Data Formats

At a minimum, all vector data is to be supplied as an Arc/Info coverage and Arc/Info interchange file, e00. All raster data is to be supplied as an Arc/Info GRID and Arc/Info interchange file. All digital imagery, such as scanned aerial photographs, is to be supplied as tagged image file format (tiff) files with the proper header file for geo-referencing purposes. The cooperator/contractor should contact the park's GIS coordinator for specific data formats. All data should be delivered on CD ROMs compatible with MS Windows.

Quality Control

When the cooperator/contractor has completed 10% of the spatial and attribute data development, the contractor will supply the park and Regional Technical Support Center (RTSC) at North Carolina State University the data for quality control purposes. The data should be delivered in the format specified in the Spatial Data Formats section. Once the park and RTSC have checked the data and found it acceptable, the contractor may continue data development. Once the cooperator/contractor has completed the work, the park and RTSC must accept the spatial data, attribute data, and Federal

Geographic Data Committee (FGDC) compliant metadata before the job is considered complete.

Results of tests used to verify all applicable horizontal, vertical and attribute accuracy measurements should also be provided whenever data is provided to the park and RTSC.

Metadata

All digital geospatial data should have FGDC compliant metadata in digital form developed by the producer. The metadata should be parsed using the metadata parser provided by the FDGC, http://www.fgdc.gov. The metadata should be supplied as ASCII text with a txt extension, hypertext markup language with an html extension and extensible markup language with an xml extension. The cooperator/contractor should contact the park's GIS coordinator or the RTSC contact (Bill Slocumb at North Carolina State University: e-mail at bill_slocumb@ncsu.edu or by phone at 919.515.3432) for metadata development instructions.

Appendix D.
Preferred Spelling

A dash preceding a word indicates that the word is used as the last part of a compound
A dash following a word indicates that the word is used as the first part of a compound

Abbreviations:

adv.	adverb
n.	noun
u.m.	unit modifier (adjective)
p.a.	predicate adjective
v.	verb
H	house rule (NPS adopted use; may contradict or not be listed in a dictionary)
*	*Merriam-Webster's Collegiate Dictionary, 10th ed*. or *Microsoft Encarta College Dictionary*

above-average (u.m.)

aboveground *

affect/effect
use affect as a verb meaning "to produce an effect upon."
use effect as a noun meaning "something that inevitably follows an antecedent (as a cause)"

age-specific

a.m.

appendixes H (not appendices)

archaeology H (not archeology)

backwater (n., u.m.)

-bank
- riverbank *
- streambank

base-
- baseline

battle-
- battlefield *
- battleground *

bay-
- bayfront
- bayshore

beach-
- beach grass *
- beachside *

bear-proof

-bed
- coalbed
- railbed *
- riverbed *
- streambed *

belowground

bio-
- biocontrol
- biodiversity
- bioindicator

boat launch (n.) (preferred over boat ramp)

camp-
- campground
- campstove

Canada goose (not Canadian goose)

cannot

Celsius (use °C)

check-
checklist

cleanup (n.)
clean up (v.)

clearcut (u.m., v., n.)*

co-
coauthor*
coevolve*
coexist*
cohabit*
co-hosted*
co-op * (n.)

coal-
coalbed
coalfield
coal seam

controlled
controlling

cost-
cost-effective *
cost sharing (n., p.a.)
cost-sharing (u.m.)

countywide

criteria (plural)
criterion (singular)

cross-
cross-check (n., v.)*
cross-country (u.m., adv., n.)
crosscut * (v., n., u.m.); crosscutting * (n.)
crossover * (n., u.m.)
cross-reference *
cross section * (n.); cross-section * (v.)

data (plural)
database (n., u.m.)
datalogger
data set (n.); dataset (u.m.)

day-use (u.m.); **day use** (n.)

disabled (avoid "handicapped" or "the disabled" put the "person" before the disability; write "persons or visitors with disabilities."

discernible (not discernable)

Douglas fir (not Douglas-fir) (opinions vary; use the park's preference)

down-
downgrade *
downriver (u.m.); down river (adv.)
downsize *
downslope
downstream *
downtime *
downwind

-down
breakdown *
drawdown *
run-down (u.m.)

drainageway *

dropoff

e-mail (hyphenated)

en route

ensure/assure/insure
use ensure as a verb to "make certain something will happen"
use assure to inform positively
use insure for providing or obtaining insurance

Fahrenheit (use °F)

fax (not FAX; fax is "short for facsimile" fax is not an acronym

fence-
- fenceline
- fencepost

fewer/less
use fewer to refer to a number and to individual items
use less with quantity and bulk

field-
- field hand *
- fieldhouse
- field trip
- fieldwork *

-field
- coalfield
- leachfield
- oilfield

fire-
- fire pit
- fireproof
- fire ring
- firewood

fish (both singular and plural)

flood-
- flood control
- flood-affected
- flood-impacted
- floodgate *
- flood-prone (u.m.)
- floodprone (p.a.)
- floodplain *
- floodproof
- floodproofing
- flood stage
- floodwater(s)
- floodway

flowchart

-flow
- debris flow
- lava flow
- mudflow *
- riverflow
- springflow
- streamflow
- waterflow

foot-
- footbridge
- footpath
- footprint
- foot trail

forestland/forest land
use forestland as a descriptive term
use forest land for land designated as a national forest

-form
- free-form
- landform

freshwater (n., u.m.) *

-front
- forefront
- lakefront
- riverfront

full-time (u.m., adv.) *

furbearer

GIS (u.m., n.)

grassland

ground-
- ground cover (n.); groundcover (u.m.)
- ground level (n.); groundlevel (u.m.)
- groundwater (n., u.m.)
- groundwork *

handicap access Change to "universal access," but "handicap parking" is acceptable

handicapped people Change to visitors (or people) with disabilities

handicap ramp Change to wheelchair ramp

hearing-impaired

high-
highcountry
high-use (u.m.)
high-water (u.m.)

hillside

-house
powerhouse
pumphouse

ice-
icefishing*
ice-skate; ice-skating (u.m.)

in-depth (u.m.)

indexes (not indices)

industrywide

in hand (prepositional phrase)

instream

Internet

-impaired
hearing-impaired (n., u.m., p.a.) *
sight-impaired (n., u.m., p.a.)
visually impaired (n., u.m., p.a.)

judgment

labeled

lake-
lakefront *
lakeshore *
lakeside *

land-
land classification (u.m.)
landfill(s)(ing)
landform
landholding (u.m., n.); landholder (n.)
land-management (u.m.
land-managing (u.m.)
landowner, landownership
land protection (u.m.)
land use (u.m.)

-land
forestland (see note for forestland)
grassland
parkland (as a descriptive term; but use park land for land designated as a park)
rangeland
shrubland
swampland
wildland

-latitude
high latitudes (n.); high-latitude (u.m.)
low latitude (n.); low-latitude (u.m.)
midlatitudes (n.); midlatitude (u.m.; *)
33° north latitude (lowercase)

-less Always insert a hyphen between a root word that ends in double l's (ll) and less (e.g., shell-less); however, generally insert a hyphen between a root word and less; some exceptions include:
bottomless
faultless
seasonless

leveling

life span

-life
plant life
wildlife

-line
coastline
electrical line
fenceline
gas line
pipeline
powerline
rail line
ridgeline
sewerline
shoreline
sight line
telephone line
timberline
transmission line
tree line
waterline

live-
live-capture
livetrap

long-
long-distance (adj., adv.) *
long distance (n) *
long-lived (adj) *
long-range (adj.) *
long-term (adj.) *

low-
low-cost
low-energy *
low-impact (u.m.); low impact (n.)

macroinvertebrate (n.)

micro-
microenvironmental *
microhabitat *
microorganism *

mid-
midbasin
midcoast
midday
midlatitude (n.; u.m.)
midstream
midsummer
midwinter
midyear
mid-19th century

modeled

mountaintop
mountainside

mud-
mudflow *
mudslide (AGI)

multi-
multiaccess
multiagency
multiresource
multiyear

natural resource (u.m.)
natural resources (n.)

non-
nondestructive
nonessential *
nonexistent *
nonfederal
nonforest
nongame (adj.)
nongovernment
nonhazardous
nonmigratory *
nonnative *
non-point (u.m.) (source pollution)
nonporous
nonprofit
nonspecific
nontoxic

occur Most species live in or inhabit a place; they don't "occur"

old growth (n.); old-growth (u.m.)

on-
- ongoing *
- online
- on-ramp *
- onshore *
- on-site

open space

over-
- overbrowse, overbrowsing
- overemphasis
- overfishing *
- overpopulate *
- oversized
- overuse *
- overwinter, overwintering

parkwide

part-time (u.m., adv.) *

passageway

photocopy (n., v.) *

p.m.

policy-
- policy maker
- policyholder

pre-
- prearrange
- prebreeding
- preconditioned
- preconstruction
- predetermine
- predisturbance
- predominate

printout

pull-
- pull-in (n., u.m.)
- pulloff
- pullout *
- pullover

preventive (not preventative)

radio-
- radio collar (n., v.)
- radio-collared (u.m.)
- radiotelemetry (n.) *
- radio-tracking (u.m., n.)
- radio transmitter (n.)

rail-
- railbed
- railcar
- railhead
- rail line
- railroad
- railworker
- railyard

rain-
- raindrop
- rain fall
- rain forest
- rainwater

re-
- re-create (to create again)
- recreate (to take recreation)
- reengineer *
- reexamine *
- reestablish *
- reevaluate *
- reinstall
- reintroduce
- re-present (to present again)
- represent (to stand for)
- rerouting
- resurvey

recreation/recreational
Use recreation when referring to facilities, as a recreation facility, resource, area, potential, trail;
Use recreational when referring to the experience or to an activity that is a form of recreation (e.g., recreational program, opportunity, driving, visits)

right-of-way
rights-of-way (plural form)

river-
- riverbank *
- riverfront *
- riverside *

roadway Avoid; use road(s)

road-
- roadblock
- road map
- roadside
- road trip

-road
- offroad

rock-
- rock-climbing (n., u.m.)
- rockfall (n., u.m.)
- rockslide

salt-
- salt marsh (n.); saltmarsh (u.m.)
- saltwater (n., u.m.) *

sand-
- sandbag
- sandbar
- sand dollar
- sand flea
- sand fly
- sandblast
- sand dune
- sandstone

sea-
- seabird
- sea grass
- sea level
- sea life
- sea scape
- seashore
- seaside
- seawall
- seawater

seasonless

self-guiding trail not self-guided; avoid writing "nature" trail (most trails are nature trails in some way) and avoid writing "interpretive" trail (visitors may expect a ranger-led tour)

semi-
- semiannual
- seminatural

sewage treatment

short-term (u.m.)

shrubland

-side
- eastside *
- hillside *
- lakeside *
- mountainside *
- northside *
- riverside *
- roadside *
- southside (u.m.)
- streamside *
- topside *
- trailside *
- waterside *
- westside (u.m.)

sight-impaired (p.m., n., u.m.) not visually impaired

wetland

white-tailed deer

whitewater (n., u.m.)

-wide
- coastwide
- communitywide
- countywide
- districtwide
- industrywide
- nationwide
- parkwide
- regionwide
- servicewide
- statewide
- trailwide
- worldwide

wild-
- wildfire
- wildland
- wildlife

wind-
- windblown (u.m.)
- windbreak *
- windswept
- windsurfing

workshop

workup (n.; an intensive diagnostic study)

-work
- fieldwork *
- groundwork *
- teamwork

ZIP code; in addresses use ZIP + 4 when possible

Appendix E.
Units of Measure Abbreviations

Units of Measure Abbreviations

Note: use one space between numerals and abbreviations; however, not when when using K for kilobytes and not when using temperature degrees (36ºC).

cm	centimeter
cu	cubic
cc	cubic centimeter
cm^3	cubic centimeter (in scientific contexts; see also cc)
ft^3	cubic foot
in^3	cubic inch
yd^3	cubic yard
d	day
d or day	day
ºC	degree Celsius (symbol immediately precedes letter)
ºF	degree Fahrenheit (symbol immediately precedes letter)
ft	foot
GIS	geographic information system
GPS	global positioning system
g	gram
GIF	graphic interchange format
ha	hectare
h or hr	hour
html	hypertext markup language
http	hypertext transfer protocol
in	inch
IP	Internet protocol
kB	kilobyte (in scientific contexts)
kg	kilogram
km	kilometer
km/h	kilometers per hour
kW	kilowatt
kWh	kilowatt-hour
L	liter (capitalized to avoid confusion with number 1)
m	meter
te	metric ton
mi	mile
mpg	miles per gallon
mph	miles per hour
mg	milligram
mL	milliliter
min	minute
mo	month
pH	negative log of hydrogen ion concentration
rpm	revolutions per minute
sec	second
sq	square
ft^2	square foot
in^2	square inch
mi^2	square mile
yd^2	square yard
wt	weight
yd	yard
yr	year

Appendix F.
State Abbreviations

State Abbreviations

AL	Alabama	LA	Louisiana	OH	Ohio
AK	Alaska	ME	Maine	OK	Oklahoma
AZ	Arizona	MD	Maryland	OR	Oregon
AR	Arkansas	MA	Massachusetts	PA	Pennsylvania
CA	California	MI	Michigan	RI	Rhode Island
CO	Colorado	MN	Minnesota	SC	South Carolina
CT	Connecticut	MS	Mississippi	SD	South Dakota
DE	Delaware	MO	Missouri	TN	Tennessee
FL	Florida	MT	Montana	TX	Texas
GA	Georgia	NE	Nebraska	UT	Utah
HI	Hawaii	NV	Nevada	VT	Vermont
ID	Idaho	NH	New Hampshire	VA	Virginia
IL	Illinois	NJ	New Jersey	WA	Washington
IN	Indiana	NM	New Mexico	DC	Washington, DC
IA	Iowa	NY	New York	WV	West Virginia
KS	Kansas	NC	North Carolina	WI	Wisconsin
KY	Kentucky	ND	North Dakota	WY	Wyoming

As the nation's primary conservation agency, the Department of the Interior has responsibility for most of our nationally owned public land and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

NPS D-13 November 2004 (revised November 2005)

National Park Service
U.S. Department of the Interior

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http://www.nps.gov/nero/science/